CO GUARDIAN

USER'S MANUAL
FOR
AERO-152A

(Pages 1 to 3 contain general information on CO Guardian.
Pages 4 to 6 contain information specific to Aero 152A)

What is Carbon Monoxide?

Carbon Monoxide (CO) is a colorless, odorless, tasteless and toxic gas produced as a by-product of combustion. An estimated 10,000 people are affected by carbon monoxide poisoning each year in the United States. Eight hundred to 1,000 die.

Carbon Monoxide results from incomplete combustion of fuel in an engine, vehicle, appliance, tool or other device. Each has the potential to produce dangerous levels of carbon monoxide gas. This is a particular problem in motor vehicles, where carbon monoxide can leak into the passenger compartment and accumulate to dangerous levels.

The average healthy adult might not feel any symptoms when exposed to lower levels of CO. People with cardiac or respiratory problems, infants, unborn babies, pregnant mothers, or elderly people can be more quickly and severely affected by CO.

Carbon Monoxide Poisoning: Don't count on symptoms of carbon monoxide to warn you: It's colorless, odorless, and tasteless even though it is usually found mixed with exhaust gases and fumes. If you smell fumes or feel any of the following symptoms, and your CO Guardian is going off, you should assume that carbon monoxide is present. Symptoms include: feeling of sluggishness, warmth, and tightness across your forehead followed by headache, a throbbing pressure at the temples and ringing in the ears. Severe headache, nausea, dizziness, and dimming of vision may follow.

NOTE: CO Guardian units detect CO. They do not detect fire, smoke or other gases.

What do I do if Carbon Monoxide has entered the cabin during flight or while driving?

If any of the previously mentioned physical conditions exist, do the following:
Shut off the heater, air conditioning or any other opening to the engine compartment.
Open a fresh air source immediately.
Don't smoke.
Use 100% oxygen if possible.
Land as soon as possible (aircraft only).
Be sure the source of the contamination is corrected before further flight.

Where to Install your CO Guardian:

Portable Models:

The portable CO Guardian units have been designed to be plugged into a standard cigarette lighter (14V/28V, input range (12V-30V DC) see specifications) inside your cockpit/auto/recreational vehicle. The unit has been built to fit snugly, with a special locking system so it will not dislodge due to vibration. Since the unit is designed to fit tightly into the adapter, you may even need to press the unit with a fair amount of force into the cigarette lighter adapter.

If you don't have a cigarette lighter connector or want to install an additional one, the best place to install is in the panel/dash midway between the floor and the inside roof of your cockpit/auto/recreational vehicle.

<u>Panel Mount units (Home built aircraft only):</u>

These can be installed at any available place in your plane. The best place to install is in the panel/dash midway between the floor and cabin ceiling. Contact your local A&P mechanic, FBO or install it yourself. We highly recommend that you install it with a pullable 3-amp circuit breaker. Locate circuit breaker in the same general area with existing circuit breakers. Label the panel "CO Detector" using standard engraving. Lettering should be the same height as existing C/B panel. Both models come with limited 24 AWG- 1 foot wire (additional wire may be required).

Panel Mount units do not have an on and off switch. A pullable circuit breaker must be used to silence the alarm and for safety.

The CO Guardian will alarm when the CO reaches the sensor. CO may be present in other areas. Improper installation location can affect the performance of your CO Guardian.
<u>Do not install the CO Guardian on the floor of your cockpit/automobile. This may cause false alarms</u>

Do not install in an excessively dusty or dirty area
Do not obstruct the vents located on the side of your CO Guardian
Do not install where air movement exists. The CO Guardian will better detect the presence of CO if the sensor does not have air blowing over it rapidly. Rapid air circulation may cause the sensor to display inaccurate readings
Do not install the CO Guardian in areas were it might be out of temperature and humidity ranges (see specifications)
Extreme temperatures and humidity conditions may affect the sensitivity of the alarm.
Before start-up, always check the operation of the unit.

CO Guardian: Description of units

Your CO Guardian uses "state of the art technology" to detect and alert you before dangerous levels of CO build up in your cockpit/auto/recreational vehicle. This will alert you with enough time to take action before the presence of CO begins to affect your health.

<u>Sensor</u>
CO Guardian uses a new generation of gas sensors with "state of the art" solid-state technology. Its extremely reliable sensor monitors the presence of CO inside your cockpit / automobile.

<u>Buzzer</u>
Produces a loud beep, 85 dB @ 2.4 KHz

<u>Lights</u>
The CO Guardian indicates the presence of CO using a three-color light indication:
Green: this is the normal state; means there is no CO or the CO level is negligible - below 50PPM.
Yellow: Presence of traces of CO usually not exceeding 70PPM.
Red: Presence of CO greater than 70 PPM
(Alarm levels specific to the model you have purchased are listed elsewhere in this manual).

<u>Numerical display (Not for all models)</u>

The digital display indicates the CO level in PPM (Parts Per Million).
To minimize power consumption, the digital display will remain OFF as long as no CO is in your cockpit/auto/recreational vehicle.

<u>Micro-controller</u>

CO Guardian combines a high performance "state of the art" micro-controller, with a highly reliable sensor in a small and compact casing to provide the best CO detector.

When the CO sensor detects CO, it sends the information to the micro-controller. The micro controller is pre-set with a tabulation of CO level & time period, based on how long the human body can tolerate a particular level of CO without adverse effects. Once the micro controller determines that a particular CO level input received from the CO sensor has persisted for a length of time considered harmful to the human body, it sets off the alarms. This will ensure the alarm is triggered before a dangerous level of carboxihaemoglobin builds up in your blood.

<u>Understanding your CO Guardian</u>

Powering-up the unit
  * Plug your unit into a standard cigarette lighter (Portable models).
  * This unit is designed for input voltage ranging from 12 to 30 volts DC only.

<u>Self-check routine</u>
Every time you power up the unit, a self-test routine begins. The test checks for functionality of the critical components such as the CO sensor, temperature sensor, and the integrity of the whole system. Before start-up, always check the operation of the unit.

(Self check routine/ sequence, specific to Aero 152A is given subsequently in this manual.)

Maintenance
- Your CO Guardian needs very little maintenance. Perform the self-test routine before start-up.
- Keep the sensor free of dust, and vacuum the CO Guardian vents periodically with your vacuum cleaner soft brush.   If needed, the CO Guardian may be wiped or dusted with a dry cloth or duster.

Replacing the fuse: (Portable models)

Using a standard slotted screwdriver, remove the fuse holding nut at the nose by turning counter clockwise. Be careful not to lose the spring behind the fuse. Replace with new fuse (See Specs.) and check the operation of the unit.

Check the circuit breaker panel (All models).

Note: This product is intended for use in enclosed areas occupied by humans. Because of the sensitivity, it is not designed to measure compliance with UL 2034, OSHA, or other industrial standards.

LIMITED WARRANTY

WARRANTY COVERAGE: CO GUARDIAN LLC. WARRANTS TO THE ORIGINAL CONSUMER PURCHASER, THAT THIS DETECTOR WILL BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF **THREE (3) YEARS** FROM DATE OF PURCHASE. THE MANUFACTURER'S LIABILITY HEREUNDER IS LIMITED TO REPLACEMENT OF THE PRODUCT, REPAIR OF THE PRODUCT OR REPLACEMENT OF THE PRODUCT WITH REPAIRED PRODUCT AT THE DISCRETION OF THE MANUFACTURER. THIS WARRANTY IS VOID IF THE PRODUCT HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLECT, TAMPERING OR OTHER CAUSES NOT ARISING FROM DEFECTS IN MATERIAL OR WORKMANSHIP. THIS WARRANTY EXTENDS TO THE ORIGINAL CONSUMER PURCHASER OF THE PRODUCT ONLY.

Warranty Disclaimers: Any implied warranties arising out of this sale, including but not limited to the implied warranties of description, merchantability and fitness for a particular purpose, are limited in duration to the above warranty period. In no event shall the Manufacturer be liable for loss of use of this product or for any indirect, special, incidental or consequential damages, or costs, or expenses incurred by the consumer or any other user of this product, whether due to a breach of contract, negligence, strict liability in tort or otherwise. The manufacturer shall have no liability for any personal injury, property damage or any special, incidental, contingent or consequential damage of any kind resulting from gas leakage, fire or explosion.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of consequential or incidental damages, so the above limitations or exclusions may not apply to you.

Legal Remedies: This warranty gives you specific legal rights and you may also have other rights that vary from state to state.

Warranty Performance: During the above warranty period, your product will be replaced with a comparable product if the defective product is returned, postage prepaid, to CO Guardian, Customer Service Department, 1951 East Airport Drive, Tucson, AZ 85706, together with proof of purchase date. Please include a note describing the problem when you return the unit. The replacement product will be in warranty for the remainder of the original warranty period. Other than the cost of postage, no charge will be made for replacement of the defective product.

Your Carbon Monoxide Alarm is not a substitute for property, disability, life or other insurance of any kind. Appropriate insurance coverage is your responsibility. Consult your insurance agent.

Warranty Registration

Your unit is automatically registered for a 3-year limited warranty from date of purchase, provided you retain the proof of purchase (invoice). However, to ensure that you are informed of the latest updates and news on our products, please take a moment to fill out the warranty card that comes with the product, and mail it to us at:

        CO Guardian LLC.
        1951 East Airport Drive
        Tucson, AZ 85706
        Tel 520-889-6327; Fax 520-889-8249;   Email support@coguardian.com

(You may also register for warranty at www.coguardian.com)

Your unit has a Serial Number. Please check that the unit you receive has the same serial number as shown on your invoice.
Important: Do not attempt to open unit. If unit is opened, warranty will be void.

Even if you have purchased the unit from one of our distributors, you can contact us directly at the above address for technical / warranty support or in case you have any problems with your unit.

Product Specifications for Aero 152A:

Power supply: 12/28 VDC, from a standard cigarette lighter
Power consumption: 1 W Average
Fuse: Use GMI type, fast acting fuse 3A 250V, size 5x20 mm
Temperature range: 30 F to 120 F
Humidity range: 10-90% RH non-condensing
Sensor calibration: Each unit calibrated at 100 PPM and 500PPM
Sounder alarm: 85 dB at 10' @ 2,4 kHz
Unit malfunction: 1 beep every 30 seconds, and the corresponding flashing light (see troubleshooting)
Test/reset button: Every time you push the test button the unit will go to a self-check routine after the reset condition (unit will reset in the event of an alarm)

Size: 5" (length) x 1.9" (width) x 1.1" (height)

SELF CHECK SEQUENCE:
152A:
UNITS WITH DIGITAL DISPLAY

- Display shows number 0.
- Buzzer beeps 2 times.
- Flashing Green Light.
- Flashing Yellow Light
- Flashing Red light.
- Steady Green light comes ON.
- Display shows 1, 2,….till 9, and then 0.
- Buzzer beeps once.
- Quick flashing Yellow light.
- Digital display turns OFF (to minimize power consumption)
- Green remains ON, Red and Yellow lights OFF.

Resetting the unit:

Pressing the Test / Reset button (all models) during an alarm condition will silence the buzzer for a short period of time, typically 90 seconds. The unit will go for a self-check routine, and if there is still a high level of CO (above 50 PPM), the buzzer and the corresponding color light will automatically re-activate.

If the CO has dissipated, the unit will go at a normal status, the Green Led ON and the display turned OFF until a new condition alarm occurs.

Troubleshooting

Visual and audible signals

In order to check for a possible error, either unplug the unit and then plug back in, or press the Test/Reset button.
If, after the self-test routine, the unit doesn't go to a normal status with the green light on, check for the following:

1) Flashing Green, Red, and Yellow light indicate a problem associated with the CO Sensor
2) Flashing Red light: A problem associated with the temperature sensor.
3) Any other combination of flashing lights (that is not a normal or Condition alarm) will indicate a problem with the micro- controller.
4) The unit does not operate at all. A possible problem associated with the fuse (see replacing the fuse), or there is no power to the cigarette lighter adapter.
5) No display of numbers 0 to 9 during the self-test routine - numerical display needs checking.

For 1 to 3 above, you will hear a short beep every 30 seconds. Contact us for technical support if you experience any of the above conditions.

CO GUARDIAN

ALARM CONDITIONS:

CO LEVEL RANGE IN PPM (PARTS PER MILLION)	DIGITAL DISPLAY	LIGHT INDICATION	BUZZER	BUZZER AND LED ALARM WILL GO AFTER
LESS THAN 40 PPM	ZERO	GREEN		
40 PPM	4 AND 0 ALTERNATING	GREEN		
50 PPM 60 PPM	5 AND 0 ALTERNATING 6 AND 0 ALTERNATING	YELLOW YELLOW	BEEPS	10 MINUTES
70 PPM 80 PPM 90 PPM	7 AND 0 ALTERNATING 8 AND 0 ALTERNATING 9 AND 0 ALTERNATING	RED RED RED	BEEPS BEEPS BEEPS	5 MINUTES 5 MINUTES 5 MINUTES
100 200 300	STEADY 1 STEADY 2 STEADY 3	RED	BEEPS	5 MINUTES 3 MINUTES 1 MINUTES
400 500 600 700 800	STEADY 4 STEADY 5 STEADY 6 STEADY 7 STEADY 8	RED	BEEPS	IMMEDIATELY
Above 900	STEADY 9	RED	BEEPS	IMMEDIATELY

Note:

The digital display is designed to show the reading of the CO level instantaneously.
But the audio and visual alarms will be triggered after a gap determined by the intensity of the CO level and the duration for which that level persists.. For lower levels of CO the alarm will sound after a delay, whereas for higher levels of CO, the alarm will sound almost instantaneously. This time chart is shown below:

   50-70 PPM alarm goes after 10 minutes.
   70-150 PPM alarm goes after 5 minutes.
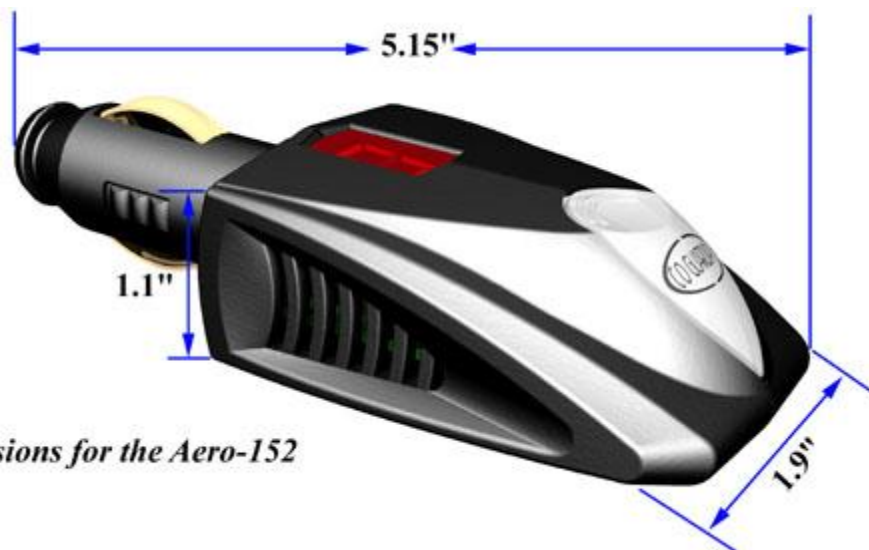   200 PPM alarm goes after 3 minutes.
   300 PPM alarm goes after 1 minute.
   Above 400 PPM alarm goes instantly [*].

([*] - Does not take into account the minimum response time, which is typically < 10 seconds, as well as the warm-up time of ~ 160 seconds when you first power-up the unit).

When digital display shows zero and a number alternately, it means that the CO level is below 100 PPM. E.g. 4 and 0 means 40 PPM.

If the digital read-out shows a steady number without a zero, it means CO level is now in hundreds of PPM; e.g, a steady 4, means 400 PPM.

5.15"

1.1"

1.9"

Dimensions for the Aero-152